DOCUMENT RESUME

ED 144 121 CS 501 813

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TITLE Effects of Eye Contact, Posture and Vocal Inflection upon Credibility and Comprehension.
PUB DATE 76
NOTE 35p.; Study prepared at University of Miami

EDRS PRICE MF-$0.83 HC-$2.06 Plus Postage.
DESCRIPTORS *Body Language; College Students; *Communication Skills; *Credibility; Eye Voice Span; Higher Education; Interaction Process Analysis; *Listening Comprehension; *Nonverbal Communication; Public Speaking; *Speech Communication
IDENTIFIERS Audience Response; Communication Research

ABSTRACT

In order to test whether constant eye contact, formal posture, and varied vocal inflection increase source credibility and listener comprehension, 144 college students in an introductory speech communication course were placed in groups of equal size that listened to the same informative speech. The speaker presented to each group a different combination of the independent variables, and, after the subjects were tested for their comprehension of the speech, they rated the speaker's credibility. Analysis of the effects of the three independent variables led to the following conclusions: Eye contact seems to enhance both listener comprehension and speaker credibility, though inconsistencies between eye contact and vocal inflection may lower the speaker's believability; the speaker's posture has little effect on either credibility or comprehension; varied or limited vocal inflection has no significant effect upon the speaker's credibility, except for the likability factor of credibility; and differences in vocal inflection do not affect listener comprehension. Tables of the analyzed data illustrate the text. (RL)

EFFECTS OF EYE CONTACT, POSTURE, AND VOCAL INFLECTION UPON CREDIBILITY AND COMPREHENSION

Steven A. Beebe

Speech teachers since the time of Aristotle, Cicero, and Quintilian have noted the significance of effective speech delivery. In support of the ancient rhetoricians, numerous studies have concluded that speech delivery variables may improve a speaker's credibility and enhance listener comprehension.[1] Recent surveys indicate that "developing effective delivery" remains a primary instructional objective in the speech classroom.[2] Additional evidence, however, suggests that several delivery cues may not be significant determinants of effectiveness.[3] Therefore, questions remain regarding which delivery variables contribute most to improved speaker effectiveness--more specifically, to higher credibility and greater comprehension.

Monroe[4] discovered that audiences identified a monotonous voice, stiff posture, and lack of eye contact as the three most distracting behaviors of public speakers. Speech textbook authors, relying upon both personal experience and research, note with unanimity that direct eye contact, varied vocal inflection, and "appropriate" posture are key delivery variables.[5] Reid contends, "The minimum essentials of eye contact, conversational voice, and posture themselves represent a degree of achievement."[6] Several investigations examining the importance of various delivery variables

support these authors' claims: direct speaker eye contact may improve speaker effectiveness;[7] varied vocal inflection[8] and appropriate posture[9] may also contribute to perceived effectiveness. There is little data-based theory, however, that predicts how combinations of these delivery variables interact to affect credibility and comprehension in a live public speaking context. Questions remain as to which delivery variables are most significant and also as to the effects of inconsistent or contradictory delivery cues. Studies by Mehrabian, et al.[10] suggest that nonverbal cues perceived as inconsistent affect the meaning of the message. A contradiction of the nonverbal message (e.g., delivering a speech with direct eye contact and a monotone vocal inflection), may affect the meaning of the message and have a subsequent impact upon the speaker's credibility and listener comprehension. Knowing which delivery variables are most important in influencing a speaker's effectiveness could help to clarify relationships between individual delivery cues and also provide additional insight as to the function of specific delivery variables.

Finally, most researchers who have examined relationships between delivery and speaker effectiveness have relied upon videotaped presentations rather than a live speaker. Several nonverbal researchers advocate using a live speaker because of speaker-audience immediacy and increased external validity.[11]

limited vocal inflection in contributing to enhanced speaker credibility and improved listener comprehension?

Independent Variables

1. Eye Contact. Two levels of eye contact, constant eye contact and no eye contact, were employed. Constant eye contact was defined as a speaker's eye contact with the audience 95 to 100 per cent of the time. In the no eye contact treatments, the speaker was instructed not to look at any member of the audience. She looked at her speaking notes or down at the floor, but she did not look directly at any person in the audience.

2. Posture. As with eye contact, two levels of posture were employed. In the formal posture condition, the speaker kept her back straight and her feet approximately three inches apart. Her weight evenly distributed on both feet, the speaker stood behind a music stand, which served as a lectern, so that her posture could be visible to the audience. In the casual posture speaking condition, the speaker stood with her shoulders slumped forward. Her feet were approximately ten inches apart, with her weight shifting from one foot to the other. She stood behind a music stand and leaned on it for support.

3. Vocal Inflection. Vocal inflection was defined as the fundamental frequency or pitch of the voice, as measured by a Honeywell Visicorder. The average range of vocal inflection for the limited vocal inflection treatments was

from 192 to 222 Hz. Limited vocal inflection was defined as the habitual or consistent vocal pitch of the speaker, as validated by a Honeywell Visicorder, a machine designed to provide an index of the fundamental frequency of the voice. For the varied vocal inflection treatments, the speaker had an average range of 185 to 330 Hz.

Manipulation Check of the Independent Variables. For purposes of stimulus validation, each of the speech presentations was videotaped during the experiment. A group of seventeen undergraduate students at the University of Missouri-Columbia later evaluated the video tapes on the basis of similarities of delivery presentation. They were not told that the speaker deliberately manipulated her posture, eye contact, or vocal inflection. The raters used semantic differential scales to describe the speaker's delivery in each of the stimulus presentations. The bi-polar adjectives used were selected to provide descriptions of the speaker's rate, eye contact, facial expression, posture, gestures, vocal inflection, and pronunciation. The raters' evaluations indicated that the speaker appropriately varied eye contact, posture, and vocal inflection and was able to hold constant her rate, facial expressions, gestures, and pronunciation.

The Honeywell Visicorder provided a further validation check on the speaker's manipulation of vocal inflection. Audio recordings of the same three sentences were selected from each presentation and subjected to Visicorder analysis.

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Results of the analysis confirmed that the speaker appropriately manipulated her vocal inflection.

Dependent Variables

1. Source Credibility. Credibility was measured by nine seven-point semantic differential scales. Based upon the factor structure obtained by Berlo, Lemert, and Mertz,[12] and a subsequent factor structure obtained by Beebe,[13] factor scores from nine semantic scales were selected to measure three factors of credibility. Data collected from these semantic scales were again subjected to principle-component factor analysis in the present study. Three distinct factors emerged--dynamism, believability, and likability. Table 1 presents the factor loadings for the credibility scales.

2. Comprehension. Comprehension was measured by a twenty-item, four-foiled, multiple-choice test. The questions were prepared to cover the material presented in the seven-minute informative speech about computer music.[14] Content validity was established by asking four graduate students to read the informative speech and rate each question good, fair, or poor. Based upon their feedback, three questions were rewritten. An estimate of reliability was obtained by using the Kuder-Richardson Formula 20, which yielded a reliability coefficient of .63.[15]

Subjects

One hundred and seventy-one students in the Introduction to Speech Communication course at the University of Missouri-Columbia completed the experiment. Two of the eight experimental treatments were replicated, however, so that an equal cell size of at least sixteen could be obtained. Twenty-seven subjects were thus randomly eliminated from the sample. The groups of subjects that were exposed to the stimulus treatments and the control group were randomly selected from forty-three sections of the basic speech course. The final sample was composed of one hundred and forty-four subjects. Subjects represented a college population of both male and female, freshmen, sophomores, juniors, and seniors, and a heterogenous sampling of various college majors.

Procedures

Subjects were told by their instructor one week before the experiment that class would be held in the Speech Communication Laboratory. A student would be giving an informative speech to the class, because her instructor would like the student to receive some "peer evaluation" from other students. They were told that the reason they were meeting in the lab rather than in their own classroom was so the speaker's instructor could video tape the speech

to allow the speaker and instructor to review the tape together later.

All instructors involved in the study were given written instructions so that the administrative procedures would be uniform for all conditions. On the day of the experiment, when all of the subjects had arrived in the speech lab for class, the students' instructor told them, "Today you are going to have an opportunity to listen to and critique a speaker who has prepared an informative speech." The instructor further explained that "the speaker's instructor would like to have some student evaluation of both her as a speaker and the speech she will deliver." The instructor then introduced the speaker to the class, and the speaker delivered her speech, using the appropriate delivery treatment.

At the conclusion of the speech, the speaker left the room. The instructor said, "The speaker's instructor would like to get some feedback concerning how well she communicated her ideas to the audience." The instructor then passed out the comprehension test and answer sheets and instructed the students to complete the test. The instructor then distributed the semantic differential scales. The subjects were asked to read the instructions and then to complete the scales. In addition, the subjects were asked to write any comments they wished to make about the speaker's speech or presentation. Those subjects who served as a control group were asked to take the "Computer Music Test" to help validate a test given by another instructor.

A posttest-only control group design was used to test the research hypotheses for comprehension. No control group was necessary to test the hypotheses for credibility. Tests for main effects and interactions among the treatment variables were performed through a 2 x 2 x 2 factorial analysis of variance. Dunnett's Test[16] was used to compare comprehension test scores of subjects in the control group to those of subjects in the experimental groups. In addition, the mean score in the experimental groups was compared to the mean score in the control group for the comprehension variable. Fisher's Least Significant Difference Test[17] was used to analyze differences between treatments when a significant F was obtained. The alpha level set for the rejection of the null hypotheses was .05.

Results

Eye Contact and Credibility. As reported in Table 2, there was a significant eye contact and posture interaction for the dynamism factor of credibility. Dynamism factor score means for eye contact and posture interaction are presented in Table 3. The main effect for eye contact on the dynamism factor of credibility was also significant.

For the believability factor of credibility, Table 4 reports a significant second order interaction, as well as a significant eye contact and vocal inflection interaction. A significant main effect for eye contact was also present for the believability credibility factor. Table 5 reports

the factor score means for the second-order interaction. Table 6 reports believability factor score means for the eye contact-vocal inflection interaction.

Table 7 indicates a significant second-order interaction for the likability factor of credibility. There was no significant main effect for eye contact. Table 8 reports likability factor score means for eye contact, vocal inflection and posture interaction.

Eye Contact and Comprehension. Hypothesis-2 was supported. Subjects scored higher on the comprehension test when the speaker used constant eye contact than when she used no eye contact. Table 9 indicates that the control groups scored significantly lower than the eight experimental treatment groups. The mean scores of the control group and the experimental treatment groups are presented in Table 10. Dunnett's Multiple Comparison Test also confirmed that the control group scored lower than the stimulus groups.

Posture and Credibility. The third research hypothesis was not supported for either the dynamism, believability, or likability factors of credibility. Table 2 indicates that there was a significant first-order interaction between posture and eye contact on the dynamism credibility factor.

Posture and Comprehension. Hypothesis 4 was not supported. Table 9 reveals no significant main effects for posture and comprehension, nor were there any significant interactions.

Vocal Inflection and Credibility. Table 2 reveals that there were no significant interactions or main effects for vocal inflection on the dynamism factor of credibility.

As reported in Table 4, there was a significant second order interaction and a significant eye contact and vocal inflection interaction for the believability factor of credibility. However, there was no significant main effect for vocal inflection on the believability factor of credibility.

Table 7 indicates a significant second-order interaction as well as a significant main effect for vocal inflection on the likability factor of credibility. Table 8 reports factor score means for the likability dimension of credibility. Therefore, with the exception of the significant main effect for the likability factor, hypothesis 5 was generally not supported.

Vocal Inflection and Comprehension. Hypothesis 6 was not supported. Subjects in the varied vocal inflection treatments did not score significantly higher on the comprehension test than did subjects exposed to the limited vocal inflection conditions.

Discussion

It is generally assumed that a speaker's delivery will either enhance or detract from his overall effectiveness as a public speaker. The results of this study do suggest that some delivery variables, notably eye contact, may contribute to improved credibility and greater comprehension. However, the presence of first- and second-order interactions does not allow one to explicate clear relationships between the independent variables and the credibility factors.

While there were significant main effects for eye contact on the dynamism and belivability credibility factors, the presence of first- and second-order interactions should be noted. As indicated in Table 3, the factor score means for the eye contact and posture interaction suggest that the speaker was perceived as more credible on the dynamism factor in the constant eye contact treatments than in the no eye contact treatments. These results are generally consistent with previous research suggesting that eye contact may contribute to enhanced credibility.[18] The results also lend some external validity to the conclusions of researchers investigating the function of eye contact in interpersonal contexts.[19] Thus, in comparison with variations of either posture or vocal inflection, constant speaker eye contact appears to be the most consistent determinant of enhanced credibility.

In addition to taking the comprehension test and completing the semantic differential scales, each subject was asked to prepare a written evaluation of the speaker. According to these written comments, seventy-nine per cent of all subjects who were exposed to the no eye contact treatments felt that the speaker should have used more eye contact. It seems resonable to conclude that their expectations of the speaker may have been violated. This conclusion seems particularly true since the subjects were speech students who had been instructed in both class discussion and required

reading to maintain considerable eye contact in their own speeches.

Of the three independent variables examined, eye contact was the only one to result in improved comprehension scores. While some investigations have not found eye contact to be a determinant of improved comprehension,[20] subjects' mean comprehension scores in these studies were in the predicted direction. Subjects in the constant eye contact conditions had higher comprehension scores than did subjects in the no eye contact treatments. It thus seems plausible to conclude that speaker eye contact may contribute to improved comprehension of an informative speech.

From a pedagogical standpoint, this study lends credence to the speech instructor's litany for direct speaker eye contact with an audience; both credibility and comprehension may be improved. This study also supports the theory that speaker eye contact signals that the communication channel is open and the speaker is interested in the listener. Audience interest generated by constant speaker eye contact may help focus the audience's attention on the speaker and subsequently improve comprehension of the information presented.

Compared with speaker eye contact and vocal inflection, speaker posture, defined in this study as either formal or casual, appears to have the least influence upon audience perception of a speaker's credibility. Research by Mehrabian[21] has also suggested that posture may be less important than eye contact in communicating "favorable

attitudes." Mehrabian[22] also suggests that either a too-relaxed or extremely rigid posture may communicate less positive attitudes than a more moderate pose. In light of Mehrabian's hypothesized curvilinear relationship between posture and attitudes, different definitions of speaker posture may produce different results. Perhaps the operational definitions of posture used in the present study were too extremely dichotomized. Additional research is clearly needed before definitive conclusions regarding posture and credibility can be reached.

The formal or casual posture of a speaker apparently has little effect upon the comprehension of an informative speech. But, as was the case with posture and credibility, additional research is needed before confident conclusions are made regarding the relationship between these two variables.

As confirmed by the credibility ratings, speaker posture generally had no significant effect upon audience perceptions of the speaker as dynamic, believable, or likable. Formal or casual speaker posture thus may not function as an important determinant of audience interest, as is suspected for direct speaker eye contact. Variables other than a speaker's posture may need to be stressed if improved comprehension is the desired goal.

The speaker's varied or limited vocal inflection generally had no significant effect upon her perceived

credibility. A notable exception, however, was the effect of vocal inflection upon the likability credibility factor. There was a significant main effect for vocal inflection on the likability credibility dimension. But this main effect must be qualified by the significant second order interaction. Table 8 presents the factor score means for the significant second-order interaction on the likability credibility factor.

An interesting relationship worthy of additional comment is that of vocal inflection, eye contact, and percieved credibility. This study suggests that direct eye contact may enhance speaker credibility. The presence or absence of speaker eye contact, in conjunction with speaker vocal inflection, may serve as a confounding variable when credibility is the dependent variable. When a speaker is delivering a relatively technical, informative speech and uses direct eye contact and limited vocal inflection or no eye contact and varied vocal inflection, he may be perceived as less believable than if he has either constant eye contact and varied vocal inflection or no eye contact and limited vocal inflection. This nonverbal behavior, seen as inconsistent or contradictory, may explain the significant first-order interaction between eye contact and vocal inflection, in addition to the second-order interaction on the believability factor of credibility.

The speaker's vocal inflection had no significant effect upon comprehension. As suggested by Knapp,[23] it may take more than just variation of the speaker's pitch

to affect comprehension. He suspects that listeners can adapt to any vocal presentation rather easily, and that comprehension will not be significantly affected by a simple manipulation of pitch.

The speech instructor should nevertheless continue to monitor a student's vocal inflection and suggest that the student attempt to vary his pitch. For, as findings by Woolbert[24] and Glasgow[25] imply, vocal inflection combined with variation of voice quality, rate, and volume may serve to enhance comprehension. Variation of these vocal delivery attributes may help maintain audience interest and subsequently increase comprehension.

Summary and Implications

This study examined the individual and interactive effects of speaker eye contact, posture, and vocal inflection upon source credibility and listener comprehension in an effort to substantiate claims that delivery variables play an important role in a public speaking context. The presence of first- and second-order interactions on the credibility variables may suggest that delivery cues do not operate in linear relationships to speech effectiveness. The dichotomous operational definitions of the independent variables used in this study may have helped to achieve the desirable goal of maximizing the experimental variance.

But because imappropriate delivery may occur in less extremes than defined here, some external validity may have been sacrified. Perhaps future research could incorporate a more moderate operational definition of the independent delivery variables.

The results suggest that constant eye contact may enhance comprehension. Eye contact also seemed to have some enhancing effect upon the dynamism and belivability factors of credibility. Perhaps the most interesting result is the effect of contradictory delivery cues upon speaker credibility. A speaker who has constant eye contact and limited vocal inflection may be perceived as incredulous because of the inconsistent nonverbal behavior. In the present study, when the speaker employed contradictory delivery cues she was perceived as less believable.

Speaker posture, as operationalized in this study, had little effect on either credibility or comprehension. There was also no difference between subjects' comprehension scores in the varied and limited vocal inflection treatments.

As a result of this investigation we know more about eye contact, posture, and vocal inflection, and their single and interactive effects upon credibility and comprehension. But several questions remain unanswered. Additional research could examine relationships between eye contact and vocal inflection. Particular attention should be given to contradictory messages conveyed by these two independent

variables. Both the short term and long term effects upon credibility and comprehension should be considered. As suggested by Gundersen and Hopper,[26] research should continue to focus upon interaction between delivery and other speech variables, such as composition. Relationships between attitude change and credibility could be considered. And finally, multivariate statistical analysis would provide additional insight into the relation between delivery and speech effectiveness.

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Table 1

FACTOR ANALYSIS OF CREDIBILITY SCALES

Semantic Scale	Dynamism Factor	Believability Factor	Likability Factor
aggressive-meek	0.832	0.012	0.086
energetic-tired	0.817	-0.012	0.237
active-passive	0.791	0.155	0.193
skilled-unskilled	0.727	0.286	0.144
experienced-inexperienced	0.629	0.470	0.059
honest-dishonest	0.007	0.763	0.337
informed-uninformed	0.217	0.814	0.004
friendly-unfriendly	0.327	0.001	0.820
kind-cruel	0.104	0.313	0.830

Table 2

THREE-WAY ANALYSIS OF VARIANCE SUMMARY TABLE
FOR THE DYNAMISM FACTOR OF
SOURCE CREDIBILITY

Source	DF	SS	MS	F
Eye Contact (A)	1	46.04	46.04	74.18*
Posture (B)	1	.01	.01	.02
Vocal Inflection (C)	1	1.17	1.17	1.89
A X B	1	4.78	4.78	7.70*
A X C	1	.31	.31	.50
B X C	1	.18	.18	.29
A X B X C	1	.01	.01	.02
Error	120	74.48	.62	
Total	127	127.00		

*Significant at the .05 level.

Table 3

DYNAMISM FACTOR SCORE MEANS FOR EYE CONTACT POSTURE INTERACTION

Treatment	Factor Score Mean					
Constant Eye Contact, Casual Posture	.8033	A	B	C		
Constant Eye Contact, Formal Posture	.3963			C	D	E
No Eye Contact, Formal Posture	-.4167		B			E
No Eye Contact, Casual Posture	-.7829	A			D	

Any two factor score means sharing the same letter are significantly different at the .05 level.

Table 4

THREE-WAY ANALYSIS OF VARIANCE SUMMARY TABLE FOR THE BELIEVABILITY FACTOR OF SOURCE CREDIBILITY

Source	DF	SS	MS	F
Eye Contact (A)	1	6.73	6.73	7.45*
Posture (B)	1	.70	.70	.77
Vocal Inflection (C)	1	.70	.70	.77
A X B	1	.10	.10	.12
A X C	1	4.60	4.60	5.08*
B X C	1	1.67	1.67	1.84
A X B X C	1	3.84	3.84	4.25*
Error	120	108.64	.90	
Total	127	127.00		

*Significant at the .05 level.

Table 5

BELIEVABILITY FACTOR SCORE MEANS FOR EYE CONTACT VOCAL INFLECTION AND POSTURE INTERACTION

Treatment	Factor Score Mean								
Constant Eye Contact, Formal Posture, Varied Vocal Inflection	.4486	A	B	C					
No Eye Contact, Formal Posture, Limited Vocal Inflection	.4246				D	E	F		
Constant Eye Contact, Casual Posture, Varied Vocal Inflection	.2415							G	
Constant Eye Contact, Casual Posture, Limited Vocal Inflection	.1282								
Constant Eye Contact, Formal Posture, Limited Vocal Inflection	.0993								H
No Eye Contact, Casual Posture, Varied Vocal Inflection	-.3082			C			F		
No Eye Contact, Casual Posture, Limited Vocal Inflection	-.3564		B			E			
No Eye Contact, Formal Posture, Varied Vocal Inflection	-.6775	A			D			G	H

Any two factor score means sharing the same letter are significantly different at the .05 level.

Table 6

BELIEVABILITY FACTOR SCORE MEANS FOR EYE CONTACT VOCAL INFLECTION INTERACTION

Treatment	Factor Score Mean			
Constant Eye Contact, Varied Vocal Inflection	.3451	A	B	
Constant Eye Contact, Limited Vocal Inflection	.1137			
No Eye Contact, Limited Vocal Inflection	-.0341		B	C
No Eye Contact, Varied Vocal Inflection	-.4929	A		C

Any two factor score means sharing the same letter are significantly different at the .05 level.

Table 7

THREE-WAY ANALYSIS OF VARIANCE SUMMARY TABLE
FOR THE LIKABILITY FACTOR OF
SOURCE CREDIBILITY

Source	DF	SS	MS	F
Eye Contact (A)	1	3.30	3.30	3.58
Posture (B)	1	.50	.50	.54
Vocal Inflection (C)	1	5.25	5.25	5.68*
A X B	1	.34	.34	.37
A X C	1	1.48	1.48	1.60
B X C	1	.23	.23	.26
A X B X C	1	5.04	5.04	5.47*
Error	120	110.84	.92	
Total	127	127.00		

*Significant at the .05 level.

Table 8

LIKABILITY FACTOR SCORE MEANS FOR EYE CONTACT VOCAL INFLECTION AND POSTURE INTERACTION

Treatment	Factor Score Mean							
Constant Eye Contact, Casual Posture, Varied Vocal Inflection	.5982	A	B	C	D			
Constant Eye Contact, Formal Posture, Varied Vocal Inflection	.3413					E	F	
Constant Eye Contact, Formal Posture, Limited Vocal Inflection	.2068							G
No Eye Contact, Formal Posture, Varied Vocal Inflection	.1006							
No Eye Contact, Casual Posture, Limited Vocal Inflection	-.1111				D			
No Eye Contact, Casual Posture, Varied Vocal Inflection	-.2317			C				
No Eye Contact, Formal Posture, Limited Vocal Inflection	-.4003		B				F	
Constant Eye Contact, Casual Posture, Limited Vocal Inflection	-.5055	A				E		G

Any two factor score means sharing the same letter are significantly different at the .05 level.

Table 9

MEAN SCORES OF CONTROL GROUP AND EXPERIMENTAL TREATMENT GROUPS FOR COMPREHENSION TEST

Treatment	Mean Comprehension Score
Control Group	5.31*
No Eye Contact, Casual Posture, Limited Vocal Inflection	10.15
No Eye Contact, Casual Posture, Varied Vocal Inflection	11.00
No Eye Contact, Formal Posture, Limited Vocal Inflection	10.31
No Eye Contact, Formal Posture, Varied Vocal Inflection	10.38
Constant Eye Contact Casual Posture, Limited Vocal Inflection	13.06
Constant Eye Contact, Casual Posture, Varied Vocal Inflection	13.38
Constant Eye Contact, Formal Posture, Limited Vocal Inflection	11.31
Constant Eye Contact, Formal Posture, Varied Vocal Inflection	13.56

*Dunnett's comparison confirmed that the control group scored significantly lower than each experimental group at the .05 level of probability.

Table 10

THREE-WAY ANALYSIS OF VARIANCE SUMMARY TABLE
FOR THE COMPREHENSION TEST

Source	DF	SS	MS	F
Treatments	8	808.00	101.00	13.23*
Eye Contact (A)	1	180.50	180.50	23.65*
Posture (B)	1	8.00	8.00	1.05
Vocal Inflection (C)	1	24.50	24.50	3.21
A X B	1	2.53	2.53	.33
A X C	1	5.28	5.28	.69
B X C	1	2.53	2.53	.33
A X B X C	1	15.13	15.13	1.98
Control vs. avg. (A,B,C)	1	569.53	569.53	74.62*
Error	135	1030.44	7.63	
Total	143	1838.44		

*Significant at the .05 level.